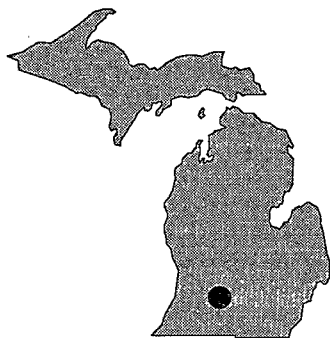




SITE FACTS



Location: Kalamazoo, Michigan

Laboratories/Agencies: U.S. EPA Risk Reduction Engineering Laboratory (RREL), U.S. EPA Robert S. Kerr Environmental Research Laboratory (RSKERL), Center for Microbial Ecology at Michigan State University (MSU), U.S. EPA Region 5, Michigan Department of Natural Resources

Media and Contaminants: Solvents in landfill and ground water

Treatment: In situ bioremediation of landfill material and ground water

Date of Initiative Selection: October 1992

Objective: To evaluate the feasibility of bioremediating the ground water and landfill material

Bioremediation Field Initiative

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Regional Contact: Dan Cozza, U.S. EPA Region 5, Waste Management Division, 77 West Jackson Boulevard, Chicago, IL 60604

Bioremediation Field Initiative Site Profile: West KL Avenue Landfill Superfund Site

Background

During the 1960s and 1970s, the West KL Avenue Landfill in Kalamazoo, Michigan, was the repository for an estimated 5 million yd³ of refuse and undetermined amounts of bulk liquid and drummed chemical waste. In 1979, the 87-acre site was closed permanently due to the discovery of contaminants in nearby residential drinking water wells. In 1983, the site was placed on the National Priority List due to the discovery of acetone, methyl ethyl ketone, methyl isobutyl ketone, dichloroethane, benzene, and other contaminants in ground water near the site. The U.S. EPA Risk Reduction Engineering Laboratory (RREL), the U.S. EPA Robert S. Kerr Environmental Research Laboratory (RSKERL), and the Center for Microbial Ecology at Michigan State University (MSU) currently are examining the feasibility of bioremediating the landfill material and underlying contaminant plume.

Characterization

Research conducted in 1990 indicated that the surface system and the aquifer are hydraulically connected, so soluble contaminants leach vertically from the landfill to the saturated zone. The plume of contamination has two lobes that are moving west from the landfill. Figure 1 shows the location of the landfill, nearby lakes, and monitoring wells, as well as the water table surface contour.

Field Evaluation

Research is being conducted under three tasks. The first task, to be conducted by RSKERL, is site characterization and modeling. RSKERL will drill wells in six locations to evaluate the geochemical and hydrological characteristics of the contaminated ground water plume and to monitor the fate and transport of the contaminants. RSKERL will provide site characterization data so that MSU can select appropriate depth intervals to sample for microbial activity.

The second task, to be conducted by MSU, involves the use of microcosms to evaluate the biodegradative capacity of the ground water. Serum bottles with aquifer material and ground water will be used to test for the presence of microorganisms able to degrade representative contaminants. MSU also will use soil-column microcosms to simulate the dynamics of the aquifer environment and estimate the rates of contaminant degradation. Microcosm studies are scheduled to commence in May 1993.

In the third task, which is under way, RREL is using three landfill lysimeter systems to assess the biodegradation of landfill material. One system



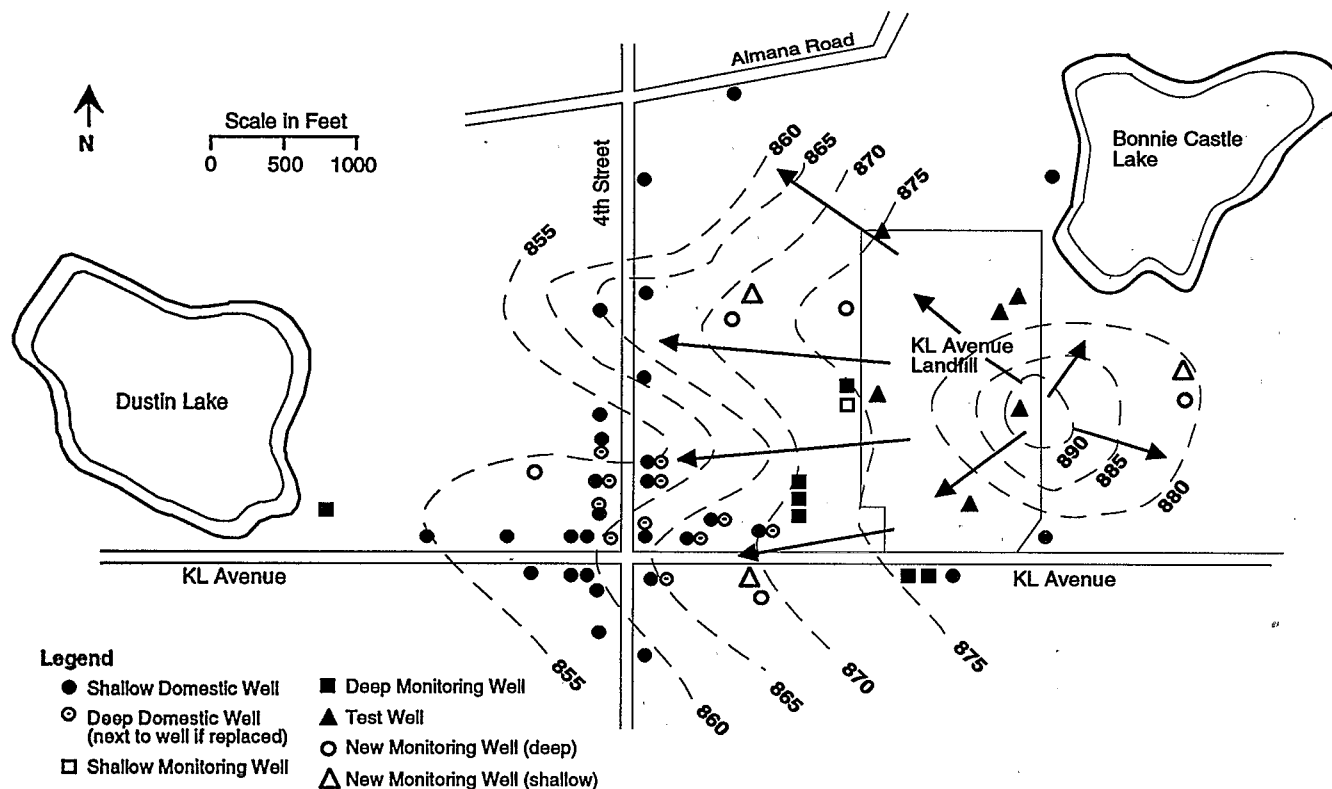


Figure 1. Water table surface contour map showing the location of the landfill, nearby lakes, and monitoring wells.

simulates the effects of a Resource Conservation and Recovery Act (RCRA) cap on the biodegradation of the fill and leachate. A second system serves as a control to assess the biodegradative capacity of the landfill material, simulating existing conditions without a cap. The third system simulates the effects of enhancing naturally occurring bioremediation to optimize biodegradation and biotransformation of the hazardous pollutants in the landfill. RREL obtained landfill samples and loaded the lysimeter systems in January 1993.

Status

A Record of Decision (ROD) was signed by EPA Region 5 in September 1990. The ROD calls for the installation of a RCRA-type landfill cap and a ground water pump-and-treat system utilizing aboveground fixed-film bioreactors. A Consent Decree, entered in the U.S. District Court for the Western District of Michigan on

November 17, 1992, ordered the potentially responsible parties to perform the actions described in the ROD. The landfill cap and the ground water pump-and-treat system are being designed concurrently with the Bioremediation Field Initiative's evaluation. The actions described in the ROD will be performed unless the ROD is amended based on the results of the Initiative's evaluation of the site.

Preliminary site assessment suggests that natural degradation is occurring in the form of anaerobic dechlorination under sulfate-reducing conditions. Pilot-scale bioremediation of the site will involve anaerobic treatment of leachates under methanogenic and sulfate-reducing conditions. Further site characterization, modeling, and microcosm studies will be conducted in spring of 1993. Laboratory, pilot, and field study results are scheduled to be reported in November 1993.

The Bioremediation Field Initiative was established in 1990 to expand the nation's field experience in bioremediation technologies. The Initiative's objectives are to more fully document the performance of full-scale applications of bioremediation; provide technical assistance to regional and state site managers; and provide information on treatability studies, design, and operation of bioremediation projects. The Initiative currently is performing field evaluations of bioremediation at eight other hazardous waste sites: Libby Ground Water Superfund site, Libby, MT; Park City Pipeline, Park City, KS; Bendix Corporation/Allied Automotive Superfund site, St. Joseph, MI; Eielson Air Force Base Superfund site, Fairbanks, AK; Hill Air Force Base Superfund site, Salt Lake City, UT; Escambia Wood Preserving Site—Brookhaven, Brookhaven, MS; Reilly Tar and Chemical Corporation Superfund site, St. Louis Park, MN; and Public Service Company, Denver, CO. To obtain profiles on these additional sites or to be added to the Initiative's mailing list, call 513-569-7562. For further information on the Bioremediation Field Initiative, contact Fran Kremer, Coordinator, Bioremediation Field Initiative, U.S. EPA, Office of Research and Development, 26 West Martin Luther King Drive, Cincinnati, OH 45268; or Michael Forlini, U.S. EPA, Technology Innovation Office, Office of Solid Waste and Emergency Response, 401 M Street, SW., Washington, DC 20460.